

CLAIMS

I/We claim:

- [c1] 1. An aircraft, comprising:
a fuselage portion;
a wing portion coupled to the fuselage portion;
an engine nacelle depending from at least one of the fuselage portion and the wing portion, the engine nacelle having an air inlet;
landing gear depending from at least one of the wing portion and the fuselage portion; and
a deployable blocker coupled to at least one of the wing portion and the fuselage portion, the blocker being movable between a stowed position and a deployed position, with at least a portion of the blocker being located between the landing gear and the inlet when in the deployed position to prevent at least a solid object propelled by the landing gear from entering the inlet.
- [c2] 2. The aircraft of claim 1 wherein the landing gear is movable between an extended position and a retracted position, and wherein the deployable blocker covers at least a portion of the landing gear when the landing gear is in the retracted position and the blocker is in the stowed position.
- [c3] 3. The aircraft of claim 1 wherein the landing gear is movable between an extended position and a retracted position, and wherein the aircraft includes a wheel well positioned to receive the landing gear when the landing gear is in the retracted position, further wherein the deployable blocker covers at least a portion of the wheel well when the blocker is in the stowed position.
- [c4] 4. The aircraft of claim 1 wherein the wing portion includes an upper surface and a lower surface facing opposite from the upper surface, and wherein

the deployable blocker depends from the wing portion of the aircraft and forms part of the lower surface of the wing portion when the deployable blocker is in the stowed position.

[c5] 5. The aircraft of claim 1 wherein the landing gear includes a main landing gear, and wherein the aircraft further comprises a nose gear forward of the main landing gear.

[c6] 6. The aircraft of claim 1 wherein the landing gear includes at least one tire and wherein the deployable blocker intersects a straight line extending between the at least one tire and the inlet.

[c7] 7. The aircraft of claim 1 wherein the wing portion has an upper surface, a lower surface opposite the upper surface and a leading edge, and wherein the inlet is positioned aft of the leading edge.

[c8] 8. The aircraft of claim 1 wherein the landing gear includes at least one tire and wherein the at least one tire is positioned forward of the inlet.

[c9] 9. The aircraft of claim 1 wherein the landing gear includes at least one tire and wherein the at least one tire is positioned aft of the inlet.

[c10] 10. The aircraft of claim 1, further comprising a turbofan engine housed in the engine nacelle.

[c11] 11. The aircraft of claim 1 wherein the landing gear is movable between a retracted position and an extended position, and wherein the aircraft further comprises a landing gear door movable between an open position and a closed position, the landing gear door covering at least a portion of the landing gear when the landing gear is in the stowed position and the landing gear door is in the

closed position, and wherein the landing gear door and the deployable blocker are movable independently of each other.

[c12] 12. The aircraft of claim 1 wherein the landing gear includes a truck carrying a plurality of wheels, each having at least one tire, and wherein the deployable blocker intersects all straight lines extending directly from all the tires of the truck to the inlet when the blocker is in the deployed position.

[c13] 13. The aircraft of claim 1 wherein the deployable blocker is generally rigid and sized to block tire fragments released by the landing gear from entering the inlet.

[c14] 14. The aircraft of claim 1 wherein the blocker is a first blocker and wherein the landing gear includes a truck carrying a plurality of wheels, each having at least one tire, and wherein the aircraft further comprises a second blocker positioned between an upper surface of at least one of the tires and at least one of the wing portion, the fuselage portion and the engine nacelle to intercept at least a solid object propelled by the landing gear, the second blocker being supported by the landing gear from a position below the second blocker.

[c15] 15. An aircraft, comprising:
a fuselage portion;
a wing portion coupled to the fuselage portion, the wing portion having an upper surface, a lower surface and a leading edge;
an engine nacelle depending from at least one of the fuselage portion and the wing portion, the engine nacelle having an air inlet positioned aft of the leading edge;
landing gear depending from at least one of the wing portion and the fuselage portion; and
a deployable blocker coupled to at least one of the wing portion and the fuselage portion, the blocker being movable between a stowed

position and a deployed position, with at least a portion of the blocker being located between the landing gear and the inlet when in the deployed position to prevent at least a solid object propelled by the landing gear from striking the lower surface of the wing portion and then entering the inlet.

[c16] 16. The aircraft of claim 15 wherein the blocker is positioned to intersect at least some trajectories originating at the landing gear and bouncing from the lower surface of the wing into the inlet.

[c17] 17. The aircraft of claim 15 wherein the blocker is positioned to intersect at least some trajectories originating at the landing gear and striking a portion of the wing lower surface positioned forward of and in lateral alignment with the inlet.

[c18] 18. The aircraft of claim 15 wherein the landing gear is movable between an extended position and a retracted position, and wherein the aircraft includes a wheel well positioned to receive the landing gear when the landing gear is in the retracted position, further wherein the deployable blocker covers at least a portion of the wheel well when the blocker is in the stowed position.

[c19] 19. The aircraft of claim 15 wherein the wing portion includes an upper surface and a lower surface facing opposite from the upper surface, and wherein the deployable blocker depends from the wing portion of the aircraft and forms part of the lower surface of the wing portion when the deployable blocker is in the stowed position.

[c20] 20. The aircraft of claim 15 wherein the landing gear includes a main landing gear, and wherein the aircraft further comprises a nose gear forward of the main landing gear.

[c21] 21. The aircraft of claim 15 wherein the deployable blocker is generally rigid and sized to block tire fragments released by the landing gear from entering the inlet.

[c22] 22. An aircraft, comprising:
a fuselage portion;
a wing portion coupled to the fuselage portion, the wing portion having an upper surface, a lower surface facing opposite from the upper surface, and a leading edge;
an engine nacelle depending from at least one of the fuselage portion and the wing portion, the engine nacelle having an air inlet positioned aft of the leading edge of the wing portion;
main landing gear depending from at least one of the wing portion and the fuselage portion, the main landing gear including a plurality of tires with at least one of the tires positioned forward of the inlet, the main landing gear being movable between an extended position and a retracted position; and
a deployable blocker coupled to at least one of the wing portion and the fuselage portion, the blocker being movable between a stowed position and a deployed position, wherein at least a portion of the blocker intersects a straight line between the inlet and the at least one tire of the main landing gear when in the deployed position to prevent at least a solid object propelled by the at least one tire from entering the inlet, and wherein at least a portion of the deployable blocker covers the main landing gear when the main landing gear is in the retracted position and the deployable blocker is in the stowed position.

[c23] 23. The aircraft of claim 22 wherein the deployable blocker depends from the wing portion of the aircraft and forms part of the lower surface of the wing portion when the deployable blocker is in the stowed position.

[c24] 24. The aircraft of claim 22 wherein the deployable blocker intersects all straight lines extending directly from all the tires of the main landing gear to the inlet when the blocker is in the deployed position.

[c25] 25. The aircraft of claim 22 wherein the deployable blocker is generally rigid and sized to block tire fragments released by the landing gear from entering the inlet.

[c26] 26. An aircraft, comprising:
a fuselage portion;
a wing portion coupled to the fuselage portion;
an engine nacelle depending from at least one of the fuselage portion and the wing portion, the engine nacelle having an air inlet;
landing gear depending from at least one of the wing portion and the fuselage portion; and
deployable blocker means coupled to at least one of the wing portion and the fuselage portion, the blocker means being movable between a stowed position and a deployed position, with at least a portion of the blocker means being positioned between the main landing gear and the inlet when in the deployed position to prevent at least a solid object propelled by the landing gear from entering the inlet.

[c27] 27. The aircraft of claim 26 wherein the landing gear is movable between an extended position and a retracted position, and wherein the deployable blocker means covers at least a portion of the landing gear when the landing gear is in the retracted position and the deployable blocker means is in the stowed position.

[c28] 28. The aircraft of claim 26 wherein the wing portion includes an upper surface and a lower surface facing opposite from the upper surface, and wherein the deployable blocker means depends from the wing portion of the aircraft and

forms part of the lower surface of the wing portion when the deployable blocker means is in the stowed position.

[c29] 29. The aircraft of claim 26 wherein the landing gear includes at least one tire and wherein the deployable blocker means intersects a straight line extending between the at least one tire and the inlet.

[c30] 30. The aircraft of claim 26 wherein the wing portion has an upper surface, a lower surface opposite the upper surface and a leading edge, and wherein the inlet is positioned aft of the leading edge.

[c31] 31. The aircraft of claim 26 wherein the landing gear includes at least one tire and wherein the at least one tire is positioned forward of the inlet.

[c32] 32. The aircraft of claim 26 wherein the landing gear includes a truck carrying a plurality of wheels, each having at least one tire, and wherein the deployable blocker means intersects all straight lines extending directly from all the tires of the truck to the inlet when the deployable blocker means is in the deployed position.

[c33] 33. The aircraft of claim 26 wherein the deployable blocker means includes generally rigid panel sized to block tire fragments released by the landing gear from entering the inlet.

[c34] 34. A method for protecting an aircraft inlet from foreign object ingestion, comprising:

 extending the landing gear of an aircraft;
 engaging the landing gear with the ground;
 moving the aircraft along the ground on the landing gear; and
 preventing at least a solid object propelled by the landing gear from
 entering an engine inlet of the aircraft by moving a deployable

blocker coupled to at least one of a wing portion and a fuselage portion of the aircraft from a stowed position to a deployed position to place at least a portion of the blocker between the landing gear and the inlet.

[c35] 35. The method of claim 34 wherein preventing at least a solid object from entering the inlet includes preventing a tire fragment from entering the inlet.

[c36] 36. The method of claim 34 wherein preventing at least a solid object from entering the inlet includes preventing an object picked up and released by the landing gear from entering the inlet.

[c37] 37. The method of claim 34 wherein preventing at least a solid object from entering the inlet includes preventing a solid object from following a trajectory directly from the landing gear to the inlet.

[c38] 38. The method of claim 34 wherein preventing at least a solid object from entering the inlet includes preventing a solid object from striking at least one of the wing portion and the fuselage portion and bouncing into the inlet.

[c39] 39. The method of claim 34 wherein preventing at least a solid object from entering the inlet includes preventing a solid object from striking at least one of the wing portion and the fuselage portion, sticking to the at least one of the wing portion and the fuselage portion, and falling into the inlet.

[c40] 40. The method of claim 34 wherein preventing at least a solid object from entering the inlet includes preventing water propelled by the landing gear from entering the inlet.

[c41] 41. A method for manufacturing an aircraft, comprising:
coupling a wing portion to a fuselage portion;

coupling an engine nacelle to at least one of the fuselage portion and the wing portion, the engine nacelle having an air inlet;
attaching landing gear to at least one of the wing portion and the fuselage portion; and
mounting a deployable blocker to at least one of the wing portion and the fuselage portion, the deployable blocker being movable between a stowed position and a deployed position, with at least a portion of the deployable blocker being located between the landing gear and the inlet when in the deployed position to prevent at least a solid object propelled by the landing gear from entering the inlet.

[c42] 42. The method of claim 41 wherein the landing gear is movable between an extended position and a retracted position, and wherein mounting a deployable blocker includes coupling the deployable blocker to cover at least a portion of the landing gear when the landing gear is in the retracted position and the deployable blocker is in the stowed position.

[c43] 43. The method of claim 41 wherein the wing portion includes an upper surface and a lower surface facing opposite from the upper surface, and wherein mounting the deployable blocker includes coupling the deployable blocker to depend from the wing portion of the aircraft and form part of the lower surface of the wing portion when the deployable blocker is in the stowed position.

[c44] 44. The method of claim 41 wherein the landing gear includes at least one tire and wherein the mounting the deployable blocker includes mounting the deployable blocker to intersect a straight line extending between the at least one tire and the inlet.

[c45] 45. The method of claim 41 wherein the wing portion has an upper surface, a lower surface opposite the upper surface, and a leading edge, and

wherein coupling an engine nacelle includes coupling an engine nacelle with the inlet positioned aft of the leading edge.

[c46] 46. The method of claim 41 wherein attaching a landing gear includes attaching a landing gear having at least one tire positioned forward of the inlet.

[c47] 47. The method of claim 41 wherein the landing gear includes a truck carrying a plurality of wheels, each having at least one tire, and wherein mounting the deployable blocker includes mounting the deployable blocker to intersect all straight lines extending directly from all the tires of the truck to the inlet when the deployable blocker is in the deployed position.

[c48] 48. The method of claim 41 wherein mounting the deployable blocker includes mounting a generally rigid blocker sized to block tire fragments released by the landing gear from entering the inlet.

[c49] 49. An aircraft, comprising:
a fuselage portion;
a wing portion coupled to the fuselage portion, the wing portion having a leading edge, an upper surface, and a lower surface facing opposite the upper surface;
an engine nacelle depending from at least one of the fuselage portion and the wing portion, the engine nacelle having an air inlet;
landing gear depending from at least one of the fuselage portion and the wing portion, the landing gear including a strut coupled to a truck having a plurality of rotatable wheels and tires; and
a blocker having a blocker device positioned between an upper surface of at least one of the tires and at least one of the wing portion, the fuselage portion and the engine nacelle to intercept at least a solid object propelled by the landing gear, the blocker device being

supported by the landing gear from a position below the blocker device.

[c50] 50. The aircraft of claim 49, further comprising at least one support member extending downwardly from the blocker device to the truck.

[c51] 51. The aircraft of claim 49 wherein the blocker device is supported by the truck.

[c52] 52. The aircraft of claim 49 wherein the truck includes at least one axle and wherein the aircraft further comprises a plurality of support members pivotably coupled to the blocker device and pivotably coupled to the axle.

[c53] 53. The aircraft of claim 49 wherein the blocker device includes a generally rigid panel sized to block tire fragments released by the landing gear from entering the inlet.